ArtMaps: interpreting the spatial footprints of artworks

Conference or Workshop Item

ArtMaps: Interpreting the Spatial Footprints of Artworks

Tim Coughlan[1], Laura Carletti[1], Gabriella Giannachi[2], Steve Benford[1], Derek McAuley[1], Dominic Price[1], Cristina Locatelli[2,3], Rebecca Sinker[3] & John Stack[3]

[1]University of Nottingham
Nottingham, UK

[2]University of Exeter
Exeter, UK

[3]Tate
London, UK

timcoughlan99@gmail.com,{laura.carletti, steve.benford, derek.mcauley, dominic.price}@nottingham.ac.uk, g.giannachi@exeter.ac.uk,{cristina.locatelli,rebecca.sinker,john.stack}@tate.org.uk

ABSTRACT

Creating and utilizing simple links between items and locations in map-based systems has become a mainstream component of modern computing. In this paper, we explore support for 'art mapping', an activity that requires consideration of more complex interpretations of spatial relationships as users engage with identifying locations of relevance to artworks. Through a user study of the ArtMaps platform, and an exploratory study with professional artists, we identify diverse interpretations of spatial meaning in relation to art. We find that art mapping highlights potential for more active engagement with art through technology, but challenges existing systems for spatial representation. Through connecting our findings with work on designing for interpretation, and on space and place in HCI, we contribute new understanding of creating engagement through the spatial interpretation of art, and define potential characteristics and uses of holistic 'footprints' for artworks.

Author Keywords

Art; location; maps; interpretation; museum; geotagging

ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

INTRODUCTION

The tagging of items to geographical coordinates is an essential feature of online mapping, social and locative media, and photography. The meanings attached are relatively simple, such as the point a photo was taken, or the address of a business. Yet these act to bridge complex forms of human cognition and semantics for understanding the physical world, with computational requirements for defined entities and relationships to query, analyse, and usefully represent in various applications.

CHI 2015, April 18 - 23, 2015, Seoul, Republic of Korea

ACM 978-1-4503-3145-6/15/04…$15.00
http://dx.doi.org/10.1145/2702123.2702281

In enhancing these connections, future applications may demand greater nuance and diversity of spatial representation. In this paper, we explore the practice of 'art mapping' as an application of more complex interpretations of geotagging. Fundamentally, art mapping prompts people to tag artworks to locations on a map. The concept emerged for us in a project to develop novel forms of engagement with geographical data around an online art database. Through this, we have explored the complexity of interpretations that this apparently simple activity produces. Similar activities have emerged elsewhere, suggesting wider, nascent potential (e.g. [12,15] – discussed below).

In this paper, we analyse the results of a user study of a prototype platform, and to complement this from a different perspective, we analyse a study in which professional artists were asked to undertake art mapping and reflect upon it. Through this we make two contributions: Firstly, we demonstrate that art mapping presents new ways to engage with online art collections, with potential to prompt active engagement with art, artists, history, locations, and personal interpretations. This in turn has potential to elicit valuable forms of information. Secondly, art mapping activities present new opportunities and challenges in designing support for human ways of interpreting object-location relationships. This expands the application of concepts of multiple interpretation, ambiguity, space, and place, which have been highlighted as significant to HCI. Using these, we identify characteristics for systems to support novel interactions with the holistic 'footprints' of artworks.

Before introducing the project and studies, we summarise relevant trends to show how art mapping holds potential as a novel form of engagement with art and location.

Engagement through Location

Research around geotagging has highlighted that engaging the public in structured data collection can lead to valuable outcomes, such as improved geographical image search [1], or quantifying the 'aesthetic capital' of locations [21]. Art mapping may hold similar potential, but our understanding of the processes of engaging in this activity are minimal.

Relevant insights can be potentially gained from other technologically-mediated locative activities, such as geocaching - leaving items in locations for others to locate via GPS and the web. Researchers have found that geocaching holds diverse motivations, from provoking

exploration of new locations, to seeing a well-known one in a new way [19]. It also provides structure through which stories and experiences can be shared [18]. Focusing on engagement with place-construction, Schaefer et al. created a collaborative authoring environment to support the use of location as an expressive element in creating narratives. While aware of the contributions of others, participant's activities did not generally involve consensus-building or collaboration around features in the environment, but instead resulted in multiple individual interpretations [22].

These 'sociolocative' practices: Social acts communicating around a physical location, have mainly focused on storytelling about authors or specified locations [8]. Art mapping extends this to include an intermediary object: an artwork, and by extension, artists, and the processes and context of the creation of the work. Activities that fit within our definition of art mapping have emerged elsewhere: Halley Docherty merged figurative paintings with Google Street View perspectives for the Guardian [12], and HistoryPin host an activity of 'Putting Art on the Map' to crowdsource locations for World War I artworks from the Imperial War Museum, UK, with over 200 'mysteries' now solved [15]. This highlights that art mapping could, like geocaching, engage and sustain interested communities.

Extending Interaction with Online Art Collections

The project was framed by trends in the museum and art gallery sector, where in many cases, digital technologies are maturing towards more central roles. Two key trends in this are engagement beyond the physical institution, and provisions to open-up authority in engaging the public.

A large number of art institutions have created online interfaces to their collection databases, with the rationale that these reach greater audiences and increase profile. Essential features include functionality to search and view images of works. Commenting, keyword tagging, and games have been used to further engage users [17]. User-generated keyword tagging and folksonomy have potential to augment professional interpretations. The type of artwork may affect how consistently people can suggest tags, but tagging has potential as an access strategy, open to personal meanings, and bridging gaps between the public and professional discourse [24]. Recent discussions of 'Open Authority' in museums argue for platforms to encourage community curation, knowledge crowdsourcing, and greater support for public use of institutional resources [20].

In summation, art mapping is a means of producing and interacting with new forms of geotagged information. It could be valuable as a means to active engagement in museums, by opening up interpretation and supporting exploration of locations in relation to art. In order to design for these qualities, we need to understand how such activities can be engaging, and define the types of relations that people interpret art as having with location. This is therefore the focus of this paper. After presenting our studies and findings, we will draw upon further literature to build implications around interpretation, space, and place.

THE ARTMAPS PROJECT

Context and Aims

Like many collecting institutions, Tate has created an online catalogue of their collection, including a web interface to digitised images of artworks, metadata, and text explanations. This in turn leads to a desire to find ways to extend online engagement beyond simple browsing or thematic tours. In this context, the ArtMaps project was conceived, aiming to find new ways to engage the public in activities that generate and reflect upon geographic information in relation to the collection, and to link work on interpretive tagging and authority in the museum space with sociolocative activities.

In contrast to the other art mapping initiatives mentioned above, we chose to take an open approach with a large, diverse collection of artworks, so as to explore the kinds of interpretations of art mapping that could be made. Our research questions were: How do people engage with, and respond to, activities involving the linking of artworks to mapping systems? And how can processes of mapping art, and the outcomes of these, be understood and designed for?

Preparing the Collection Data

ArtMaps utilizes the Tate collection database of 70,000 artworks. Of these, around 23,000 have place name tags, added by curators. Originally, these were not related directly to coordinates, indeed, over 200 relate to fictional or mythical places. Most tags are countries, cities, or landmarks (e.g. 'India', 'New York' or 'Eiffel Tower'). The automated conversion of these tags into coordinates was attempted as a starting point for the project. Tags were geocoded against databases including GeoNames [10] and Google Places [11], producing coordinates for the vast majority. This was followed by an initiative for staff and the public to locate the remaining tags. Shortcomings in accuracy and granularity were noted (e.g. works tagged with a country name would all appear at the same point), and there remained over 47,000 works that had no place tags to identify. As such, while these automated exercises provided data to initially populate the system, they also emphasised the potential value of engaging the public.

Design of the Prototype ArtMaps Platform

A website with a mobile-optimised version was developed to support art mapping with the collection. On entering the site, users are presented with a world map interface based on Google Maps, with the locations currently ascribed to artworks shown as pins. As localised knowledge is considered key, the system attempts to geo-locate users and show them the local area on entry, but users can also search for locations and explore the wider map. In addition, users can search for artists, titles, or keywords, which returns a list of relevant artworks as search results.

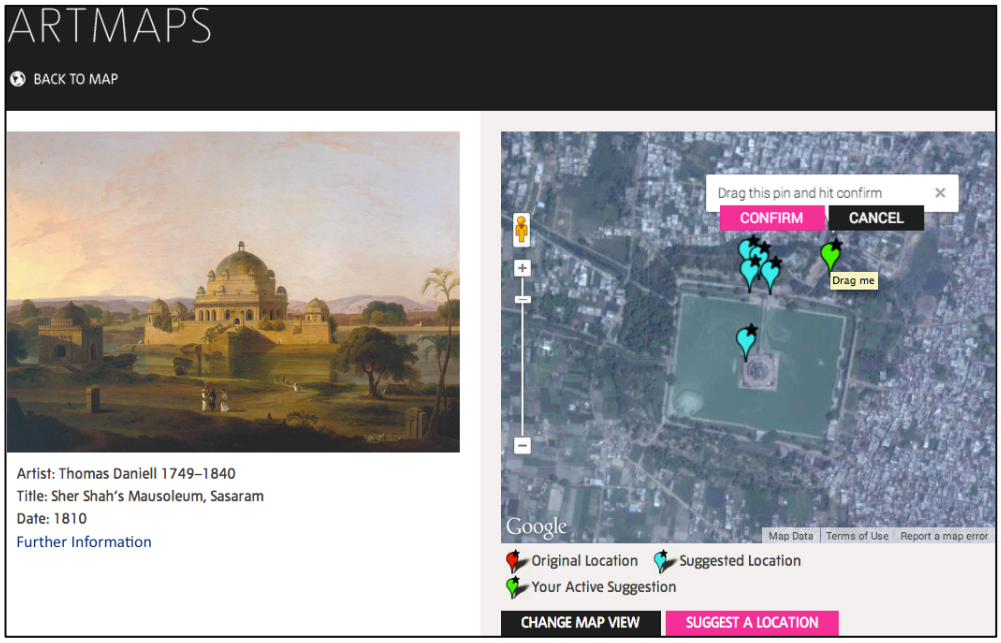

Figure 1: The ArtMaps Platform. An artwork is shown on the left - in this case, Thomas Daniell's 'Sher Shah's Mausoleum'. Users make and view suggestions through a map interface on the right. Previous suggestions from all users are shown as blue pointers.

When users select a pin or search result, the screen is split between an image of the artwork and a map of the existing location suggestions for it (see figure 1). Basic information about the artwork is provided, and a link to another page that contains more detail - commonly a text description written by curators with links to related works and information about the artist. Users are asked to make their own suggestions of locations for an artwork, and to explain these with a text comment. The meaning attributed to a suggestion is a matter for the user to decide. Multiple suggestions can be made about the same work, and these can be linked to blog entries if desired. Users can also switch between the map and a Street View perspective.

STUDIES OF ART MAPPING

In this paper we describe a user study conducted with the ArtMaps platform, where participants were recruited to use the platform and give feedback online. We also describe a study where professional artists were asked to undertake self-directed activities and reflect upon the concept. These studies were conducted in the context of a larger project, and are chosen here to provide two contrasting perspectives: interested members of the public, and makers of artworks with a high level of expertise in interpreting art.

ARTMAPS PLATFORM USER STUDY

26 participants took part in the study. We draw upon their activities and contributions, and on an online survey of open and closed questions completed afterwards by 24 of them. Participants were recruited via mailing lists and social media, and the study was conducted online to provide scope for participants from diverse locations. Geographic spread was of interest to reach beyond the vicinity of the institution, and to include a wider range of localised knowledge. In this regard, 33% of the participants reported living in a different country to the institution. The majority had an interest in arts and culture, with 63% of responses reporting a field of work or study related to heritage, arts, or libraries. 17% worked in education or research, 17% in media technology, and 4% in human resources. 67% of the study participants were male and 33% female. Ages ranged from 23–71, with a mean of 41 and 67% between 31-45.

As part of the study, suggested tasks were given to the participants, designed by the research team and experts at Tate. Participants were also encouraged to explore the platform independently. The suggested tasks had two aims: Firstly to provoke location tagging in relation to a chosen set of artworks as common foci across the participants. For this we asked participants to make suggestions on ten specific artworks, so that a concentration of suggestions around a diverse set of artworks could be studied. Secondly, we wanted to provoke varied forms of individual exploration of the collection. As such, we asked participants to suggest locations for artworks in familiar locations, and also for unfamiliar locations, and to pick an object in their environment, search for it in the collection, and suggest locations for the resulting artworks.

Participants were given up to five weeks to use the platform, with the majority taking four to five weeks before completing the exit survey. Participants received their next task when they had completed the last one. An optional final task asked participants to capture audio from their environment alongside a suggestion. This is not analysed here due to limited space.

Approach to Analysis

Our analysis examined how the location suggestions and comments made on the platform exhibited different interpretations and perspectives on the notion of mapping art (quotes from these are marked as 'platform' in the findings). Responses to survey questions provided further data from which the potential for engagement with, and challenges of, representing these different forms of interpretations could be understood (quotes marked as 'survey'). Rather than attempt to classify types of art (a complex task even for the art historian or curator), we look to identify the types of meaning users interpret the artworks to have in relation to locations. From this perspective, there are still broad distinctions to draw between – for example – suggestions given to artworks that represent an identifiable location, when compared to those that do not. However, our purpose is to identify different forms of art mapping, the processes that occur, and the support required for them.

Findings

Participants in the study made a total of 145 location suggestions and 94 comments across 80 artworks in the collection. This shows that, in addition to the ten artworks directly referenced in the tasks, participants explored further into the collection, and made contributions independently. While the participants were self-selected and the majority already held a strong interest in the arts, their feedback was encouraging for the potential of art mapping as a means to channel interest into recorded information, and support more active forms of engagement than basic browsing. Tracking down locations for artworks was, according to one participant: *"a great experience where I felt I connected more with the image than I would have done"* (P18, platform). Below we analyse characteristics of the different interpretations of how artworks could be located.

Finding the artist's perspective

The most frequent approach taken was to aim to identify the perspective taken by the artist, seen in 33 of the 80 artworks where suggestions were made. This was particular to works that figuratively depict a location. In many cases, perspective finding is engaging and potentially valuable, as even if automated tagging had accurately identified a location, perspective remains to be identified, and could be considered an equally valid or better location for a work.

Investigations of perspective were conducted through personal knowledge, various maps, Street View, or, if possible, by walking around the site. This provides a variable level of challenge: It may be non-trivial even in realistic painting or photography. For example in attempting to locate the perspective of Dennis Oppenheim's photograph: 'Reverse Processing, Cement Transplant, East River, NY'), a range of suggestions covering several kilometres of East River were given. In other cases, there is convergence, but minor variations between suggestions, because it appears impossible to identify a singular perspective with certainty (e.g. figure 2 – left).

Important reflections can develop from uncertainty. In older works, where the landscape has changed beyond clear recognition, points are suggested that fit the available data with statements clarifying a lack of accuracy. A participant noted for one work depicting a familiar location in the 18th century that *"the artist must have been situated quite a distance from the east end"* and it was *"a shame you cannot get this view anymore!"* (P14, platform) with their suggested location in the midst of a modern industrial estate. In such ways, perspective mapping provokes historical reflection, a theme that is discussed further below.

Tagging to geographic feature(s)

The tagging of geographic features was also a frequent approach, seen in response to 27 artworks (figure 2 – right). Participants enjoyed locating works in familiar places, often choosing places that they had known in the past. One stated that *"It was an enjoyable task trying to match up my memory of an area with a work"* (P2, survey). Attitudes to locating unfamiliar places were mixed, ranging from stating that *"locating artworks in places I do not know has been engaging like a treasure-hunt game"* (P6, survey), and *"I did enjoy discovering a new place through the artwork and through the maps I used to locate it"* (P14, survey) to alternatively remarks that they *"did not feel comfortable"* (P7, survey), or had *"no motivation to"* (P9, survey) locate artworks if they had no local knowledge.

Tagging to depicted features becomes more complex with artworks that contain multiple objects of interest, and in many cases these are not in realistic spatial relationships, so could not be tagged through a perspective-based approach. Take the example of David Hockney's 'Meeting the Good People'. This features several Washington D.C. landmarks, but does not present them in their natural spatial relations. An approach taken by a participant here was to individually tag the location of objects that appear in the work. A similar approach was taken in tagging pages of sketchbooks, where a single sketch may contain several locations. In this way, tagging to multiple features is a flexible approach that can overcome the non-spatial arrangements commonly found.

As the system only provided a coordinate point representation, issues arose when attempting to tag at different levels of granularity. Tagging a point is inadequate in accounting for lower fidelity depiction of features, for example to represent that *"[William] Blake's painting is definitely associated with England: the artist, the subject, the hero of the picture"* (P1, platform). It is also notable that perspective and feature-based approaches were not consistently applied by the same participant, or to the same artworks. For example in figure 1, both approaches have been used, although the perspective approach dominates.

Figure 2: Multiple suggestions tagged to the artist's perspective in relation to J.W.M Turner's 'The Colosseum, Rome, from the West' (left) and a tag for Sir William Nicholson's 'Plaza de Toros, Malaga', on the geographic feature depicted (right).

Even abstract works often take inspiration from locations, and in some cases were tagged based on their titles, such as 'Teatro Olimpico', or 'Oxford Street'. Again, investigation prompted by the request to map can lead to new discoveries and understanding. For example on Robert Delauney's 'Windows Open Simultaneously (First Part, Third Motif)', a tag was added to the Eiffel Tower with a comment that: *"I chose this object because I like the colour and abstraction…. I didn't realise it was of the Eiffel Tower until I read the blurb on the website. It was easy to map this location for the content in the image, but not sure if the mapping should only be for what we can see in the image"* (P10, platform).

Historical associations

We have already seen that perspective-based mapping can provoke historical reflections. Historical relationships with locations for both the artist (e.g. where they lived, travelled, and were inspired by) and the work (where it was painted, is, or has been, exhibited) provide further locations regularly suggested by participants (23 artworks). Unlike perspective or depicted features, they could be found for any artwork, with one participant stating that: *"there is always some locational information associated - no matter how tenuous…a picture may be painted in a location, but not be of that location. It may be by an artist who was born in X but emigrated to Y. It may be based on a literary work that was written about a location"* (P15, survey).

Carel Weight's 'Allegro Strepitoso', which depicts a somewhat fantastical scene in a zoo (figure 3), can be found via reading the description to be inspired by Regent's Park Zoo, London. E.g. *"For me the location with the strongest resonance for this picture, is Regent's Park Zoo as it has inspired the scene"* (P7, platform). Here the majority of participants suggested a location at this zoo, with several looking for a point that appeared visually similar, or checking the zoo's website to identify *"where the lions' cage is"* (P5, platform). Others noted that *"the curve of the landscaping seems to suit the content in the artwork…(but) it's hard to know what the structure of the zoo would have been like at the time"* (P10, platform) and that *"It would be interesting to discover this artwork on a visit [to the zoo] or nearby"* (P16, platform). Places of creation and host galleries were also commonly tagged in works where a geographic location was not easily identified - further tags for Allegro Strepitoso suggested both of these. Outside of the works suggested in the tasks, others such as Edouard Vuillard's domestic scene 'The Laden Table' were connected to the artist's home with a comment that *"it seems best to fall back on the original place the artist painted the work as a starting point"* (P14, platform). Contrary to the artist's intent to be ambiguous with space, the prompt to locate the work leads to investigation to find a relevant location, making visible the context and history.

Figure 3: Clustered suggestions in Regent's Park Zoo, London, made in relation to Carel Weight's 'Allegro Strepitoso'.

Archetypical representations of place

As works move away from representational depiction of specific locations, the potential for perspective and feature-based tagging reduces, but other meanings in relation to location can then come to the fore. In particular, many works represent archetypical places that viewers can connect with. In relation to Allegro Strepitoso, there is awareness that even if the work was inspired by *this* Zoo, it is purposefully ambiguous, as the artist intends to convey an archetypal notion of zoo as a place. For example statements that: "*the idea that the zoo could be an archetypical one is also appealing"* (P6, survey) and *"Another possibility is linking with an ideal "zoo", and not necessarily a real one: a place of the mind"* (P6, platform).

Personal associations

It is also clear that artworks showing archetypical places can prompt subjective responses drawing on personal memories. Julian Opie's 'Radio Wind Tyres' – an image of a generic motorway – was given as a suggested artwork in order to explore this effect. The locations suggested for it are completely divergent, covering Europe, the Middle East

and North America. Participants could readily identify locations that this work reminded them of, using aspects such as *"the blue tint of the mountains in the distance"* (P11, platform) as cues to find personally meaningful locations. It was noted as *"interesting how you can locate an artwork thorough your own personal connection to it rather than where in fact it depicts, it's great that Opie as an artist includes the viewer behind his thinking"* (P18, platform), also showing the capacity to encourage reflection on the artist's work.

Here, the location tagged is clearly seen as a personal association in comments such as: *"Location obviously not 'correct', landscape doesn't even match, but it was the first road that came to mind"* (P13, platform). There were mixed impressions of engaging with this form of art mapping, with a response that *"A clear memory of mine can be associated with this work, but a memory I have never placed on a map. This was an interesting exercise"*, while also stating that they *"avoided non-topographical works"* (both P15, survey). Though less frequent (5 artworks in total), works chosen by participants also provoked these associations. For example, a participant tagged two locations for Louise Borgeouis's 'Man, Keys, Phone, Clock', reflecting personal memories of places and people.

Representational associations

A final form of place-related meaning for viewers that can be seen in the data is an association to a location for more general reasons. For example responses to Joe Tilson's 'Three Wrist Watches' tag Switzerland - due to an association with clocks and timekeeping - and Azerbaijan, as a viewer visually associated the work with the country's flag. This type of association was infrequent (3 artworks), suggesting it is not an obvious approach, but still one that could provide engagement and potentially useful data.

To conclude our findings, we focus on broader characteristics beyond the types of suggestions made.

Multiple and primary locations

Participants understood that there are multiple possible connections between an artwork and locations, but at times were seen to assume that their suggestion to the system should be singular. One stated that they *"question creating a single location for the content of the image - was the artwork created on site or in a studio in another location?"* (P10, survey) and another that *"there are potentially multiple locations that have strong and weak ties to an artist and a particular work"* (P2, platform). Multiple suggestions could be made and there are varied examples where participants did this. Participants also reflected on which they would consider most meaningful link, qualifying their suggestions with comments of the form *"(this location) seems like the best choice"*, *"if only able to suggest/record one location … (this) has the strongest relationship"* (P14, platform), or *"the location with the strongest resonance for this picture is…"* (P13, platform).

Leaving the meaning of a suggestion open to interpretation allows choice to engage with the artwork in both artwork-appropriate and personally interesting ways. Investigations can then be intrinsically rewarding and also effective in gathering information that the system does not hold. At the same time, the ability to define the type of suggestion made is desired. Several participants wanted to clarify their type of suggestion beyond adding a comment, and one argued that: *"Location could mean many things here: provenance, production place, place depicted… without any means to indicate exactly what type of location you mean when you place a pointer I'm inclined not to do so"* (P8, platform). However, as the prior sections show, simple categorisation may not capture the nuances of a suggestion, or offer the distinct support to represent it. A further question that arises is how all suggestions for an artwork could be utilized.

Social influences

Where multiple participants made suggestions, it is possible to see elements of social influence in the comments and survey responses. Participants could be seen to be following others lead, stating for example that they chose to place their pin *"because there were other locations in the vicinity which confirmed my selection"* (P10, platform). As well as affirming that they had an appropriate location, they could follow others in the *type* of suggestion that was appropriate to make, for example stating that: *"I agree with other comment… I have suggested the (place of the) production of artwork, but it could easily be what the landscape means to the individual"* (P4, platform). In contrast, artworks without existing suggestions could be seen as an opportunity to open up the space of interpretation, e.g. in one case stating that: *"The painting didn't have any location so I am suggesting two"* (P5, platform).

A DIFFERENT PERSPECTIVE: ARTISTS REFLECTIONS

The project engaged three professional artists to capture perspectives on art mapping from artistic practice and expertise. We aimed to encourage envisioning and critical reflection around the concept, beyond what was possible in a user study of a single platform. The artists were chosen for their specific and distinct interests in using location in their work: Susan Stockwell (SS) works in a range of media and has frequently worked with maps and map-like forms. Nye Parry (NP) creates sound-based installations that utilise notions of space and place. Simon Pope (SP)'s work explores walking in the environment as a dialogic model.

The artists were commissioned to explore art mapping, produce a blog-based report, and a presentation for a public event. They were encouraged to both test the ArtMaps platform, and use other tools as desired. The blog report form allowed the freedom to integrate a range of media elements, which supported further exploration of how to represent relationships between artworks and locations. As well as viewing location as part of their practice, a serious interest is taken in other artists as inspiration and reference

points. The artists showed a fluent ability to interpret art in various ways. Therefore they were akin to a demanding power user, confident to push boundaries. As part of their exploration, SS decided to make use of ArtMaps while mobile and reflected on mapping systems in relation to their own artworks. NP used both the mobile and standard web versions, and explored the existing data on artworks in the Tate online catalogue. SP produced a larger set of blog posts, using multiple media to represent explorations of art mapping with a number of chosen artworks.

Findings

The artists reflections proved valuable as they challenged the technological underpinnings of art mapping, envisioned improvements, considered the impact as a frame through which art is viewed, and acted as highly engaged users.

Challenging technological determinations

SP stated that mapping technologies made the assumption that *"'location' was our primary concern"*, that location is *"a spatial coordinate"* and that *"things that 'happen' at these coordinates are termed 'content'"*. Similarly, NP reported being *"struck by the abstract nature of the experience"* of representing artworks as points on a map, leading to thoughts about the geographical distribution of the collection, rather than a rich appreciation of artworks.

SP was drawn to find artworks that *"challenge the system's assumptions about its representation of 'place' as spatial coordinates"*, going on to argue that geo-location pushes us to a blinkered focus on being *"ever more precise"* about location. This acted as a provocation to express what is missing through trying to represent complex space/place relationships. In reference to Robert Smithson's 'Mirror Displacement' works, in which reflections of the sky and other perspectives are depicted, he asked *"Is it enough to replicate the POV or should we also calculate the location of those things represented in the mirrors, as a log of all the locations…referenced in this work?"*. For SS, it was important that *"maps can be played with"*, and are not taken as simply *"correct"*. She noted a distinction between a functional tool that told you what works were on display in nearby galleries, and her vision of art mapping tools that supported rich local relevance and the *"location of personal geographies"*. An interesting counterpoint for SP was that web hyperlinking *"confounds physical geography"*. Thus there are opportunities for overcoming geography and to *"collide"* (NP) or *"layer"* (SS) information to make visible the location-relationships found in an artwork in new ways.

Framing the experience of artworks

All of the artists envisioned ways that art mapping could provide interesting framing to the appreciation of artworks. Such presentation is of course of major concern to artists, and often at the edge of their control.

As in the user study, perspective-based activities occurred and were particularly relevant in revealing how the artist worked, which is key for the practitioner. On finding the perspective depicted in Turner's 'Thames above Waterloo Bridge', SS reported that *"being able to stand in the same place 100 years later is a strange and profound experience. It enables you to gain a deeper understanding of what the artist perceived through his own eyes"*. NP noted that a sense of place particularly emerged when using ArtMaps while mobile. They wanted to extend this to *"tell me about Turner's London, or Constable's Suffolk"*, by juxtaposing sound, historical maps, and other resources in situ. For SS, ArtMaps was a useful way to search for place in art through combinations of location and activity, such as *"artworks that are relevant to the role of tea in London life"*.

To explore the potential to represent narrative around a work, one of SP's blog posts used maps to describe the history of Richard Sierra's 'Tilted Arc', a public sculpture that was controversially removed against the wishes of the artist. Having been cut into pieces and stored in several locations, the artist considers the work destroyed, yet it still physically exists in space, and as a story. Such narratives are considered key to NP as they highlight complex relationships between place, space and art, and could *"build up a kind of biography of the artist and the painting"*.

However, as a means of framing the experience of an artwork, tools for art mapping were of concern when used in relation to works where the artist *"has so carefully constructed the narratives by which to understand his work"*. As an example, SP highlights how Richard Long's 'Two Straight Twelve Mile Walks on Dartmoor' is designed to distil experience and feed the imagination. Mapping this could therefore *"trample all over the poetry of the work"* and *"preclude other understandings or experiences"*. NP also noted that if an artist expected a cartographic framing of their work, they may try to subvert *"the experience that a literal map reading gives you"*.

DISCUSSION

Art mapping presents opportunities to expand space-based systems such that location-relevant interpretations of meaning in artworks can be represented. In applying such Geographical Information Systems (GIS) towards 'spatial humanities' research, geographers and humanities scholars have identified related opportunities and challenges to those faced here in a system for the general public: GIS are beneficial in linking diverse forms of data to locations, but were built with positivist, reductionist, and spatially-deterministic characteristics. Hence, key facets such as subjectivity and place are difficult to represent [3].

Through devising challenging applications like ArtMaps, new forms of spatial systems and activities emerge. To draw implications we focus on two themes and highlight how existing concepts in HCI link with these: Firstly, we explore mechanisms through which art mapping provokes engagement. Secondly, we identify characteristics for systems that represent and use the 'footprints' of artworks.

Interpreting Location as a Means of Engagement

Responses to art mapping suggest new forms of interaction with digital collections, with the potential for self-directed interpretation and engagement that is desired by museums and galleries [17,20,24]. Art mapping provides a frame and provocation for varied personal and shared experiences, from tracking down perspectives, investigating historical sites that are relevant to the work, or exploring associations that the viewer finds and the artist intends to provoke.

Leveraging ambiguity by requesting certainty

Broader notions of designing for interpretation have arose in HCI as part of a greater inclusion of the arts and humanities. Gaver et al. used examples of intentional ambiguity in art, such as the Mona Lisa or Guernica, to highlight the potential of ambiguity as a positive strategy in design. They argue that: *"by thwarting easy interpretation, ambiguous situations require people to participate in making meaning…the artefact or situation sets the scene…but doesn't prescribe the result"*. This can create a *"deep conceptual appropriation of the artefact"* [9].

Two tactics that Gaver et al. suggest to enhance ambiguity are *"Add incongruous functions to breach existing genres"* and *"Over-interpret data to encourage speculation"* [9]. In ArtMaps, the ambiguity present in the spatial meanings of artworks is leveraged as a means of engagement, by asking for a concrete response of specific coordinates. Giving these responses through a system for objective cartography could seem incongruous to both the study participants and artists, but it pushed them to investigate, decide, and create answers where they might otherwise remain passive.

Harnessing the capacity for multiple interpretations

Explorations of ambiguity have extended to interpreting location in mixed reality and ubiquitous computing. One theme in this has been ways in which uncertainty around location is inherent, and can be dealt with by deliberately revealing it, as users are generally adept in exploiting and approximating it [2,5]. This points to a gulf between human ways of understanding location and spatial approaches where ambiguity is excluded or considered negatively. Sengers & Gaver argue for the potential of systems that support multiple interpretations of their use and downplay the system's authority [23]. In ArtMaps, supporting users to make multiple suggestions helps them to understand that no answer need be the single correct one, and collected data could include different interpretations of spatial meaning.

Participants were led by the contributions previously made by others, and/or took their lead from our suggested tasks. Our results describe the set of observed interpretations of art mapping from these studies, but more could exist or be devised. While characteristics of the artwork may lead towards primary forms of interpretation or most-appropriate locations, users or designers could choose from a variety of foci. We may decide to investigate the artist's perspective, or interrogate the history of the work to develop a spatial narrative around it. This plurality and adaptability should be harnessed in designing art mapping systems and activities, as a means to maintain engagement and create more holistic datasets for artworks.

Supporting the Creation of Footprints for Artworks

Given our findings, we suggest that the multiple, diverse relationships between an artwork and locations could be conceptualised holistically as a 'footprint', with spatial and 'placeful' aspects. Such a data structure could be valuable in varied applications, from providing highly personal, contextualised mobile experiences, to new visualisations of the associations between an artwork, artist, or collection and its viewers. Here we summarise our findings through this and highlight value that could be drawn, both from the data produced, and the activities that produce it.

Space and place in art mapping

Prior discussions of space and place in philosophy and HCI provide a conceptual basis through which to examine the potential characteristics of a spatial footprint for an artwork. For de Certeau, place is *"the order (of whatever kind) in accordance with which elements are distributed in relationships of coexistence"*. Space *"exists when one takes into consideration vectors of direction, velocities, and time variables"* [6]. From a HCI perspective, Harrison & Dourish, consider that Space as *"the opportunity"*, is usefully distinguished from Place as: *"the understood reality"* [13]. However, a layer-cake model that deems space or place to be the pre-requisite of the other misses the complexity of this [7,14]. Instead, Harrison & Tatar identify the meaning of a place as a semantic tangle of mutually constituting resources: people, events, and loci - objects or locations that are a focus of attention [14].

It has been argued that the notion of space is detached from realities of experience [16]. Yet spatial systems underpin how online information is linked to the physical world. Brown & Perry note that a map is *"very spatial in the sense that it is both abstract and geographical"*, but also has *"platial"* characteristics, like being read in specific places, or altering how we perceive a place [4]. Dourish argues that current spatial technologies are limited by a focus on navigation, and that designers should move from asking *"how we might find our way"* to *"how, in our encounters with space, we might find **more** than our way"* [7].

To use these concepts while avoiding a layer-cake model, we suggest that certain aspects of art mapping, such as identifying a perspective, are primarily spatial as they reflect interpretations of how an artist represents space. But comments show that these activities also provoke valuable thoughts in relation to place. Other activities, still with a spatial basis, primarily focus on developing links to places, such as investigating where the artist lived or worked, or reflecting on emergent associations in viewing archetypical representations of place. All of these activities can create spatial data, and there are multiple ways in which this can

enhance a sense of place. The footprint should therefore represent different relations of art and space (perspective, features), and also support further interaction around personal and contextual aspects of art-place relations (e.g. historical, archetypical). Thus we identify characteristics that would give a footprint value from each perspective:

A spatial perspective on footprints

Effective support for art mapping could make visible holistic views of relationships between artworks and locations. In envisioning support for the creation of this, we find the need to move from our existing ability to designate individual point-relationships, towards new interfaces and complex data structures. Key characteristics include:

Multiple, categorised links to locations: Interfaces to mapping systems used in web and social media systems are not currently designed to support multiple locations to be linked with a single object. Neither do they support different types of relationships, or capture how these should be interpreted. In art mapping, we identify a clear need for this. After the studies took place, a further iteration of the platform was developed to include support to categorise suggestions. Future work will explore how to adapt to different categorisations as suggested in the findings, and to then utilise these suggestions according to their categorisations. A further aspect is that particular links may be considered of primary importance by particular viewers. Hence, the capacity to foreground – generally or personally –could be useful in engagement and to produce useful data.

Advanced forms of representation: Our findings suggest potential to appropriate, and to create new forms of spatial representations. Using polygon functionality to represent areas, or making perspectives comprised of point and direction, would be useful additions, but capturing the footprints of works that take ambiguous, creative, or non-spatial approaches to their composition requires more than this. For example, to support the combination of perspective and feature mapping, we could envisage a juxtaposition of multiple coordinates and views, represented by folding relevant parts of the map onto parts of the artwork, and to *"collide"* the map and artwork as suggested by Nye Parry.

Amalgamations of links: As suggested by the above, some of the value in art mapping is a capacity to interrogate a holistic view of the relationships with locations. Beyond a map that shows all the relevant points, a footprint interface could visualise different types of links in meaningful ways. For example showing a story of the creation of the work, including locations the work was inspired by, where it was actually created, and where the artist learnt techniques used.

Identifying spatial relevance: In its simplest form, geo-location can reveal works relevant to current location, and other work in the ArtMaps project is exploring the use of the collection data in locative media experiences. Further data could be used to extend this, for example utilising a history of where a person has lived or visited, travel plans, or commonly searched locations, to reveal relevant art.

A placeful perspective on footprints

Combining narrative, art and spatial representation provides a new means to construct and appreciate places through historical and personal stories, and we find numerous examples where art mapping drew greater attention to places, in situ of a relevant location, or at a distance. The potential to support greater 'placeful' engagement with the footprints of artwork is therefore an important challenge and opportunity, with the following key characteristics:

Presencing: Further activities conducted in the project have involved walking between the galleries and locations depicted in the works on display, and combining historical tours with prompts to view relevant artworks. In this vein, and in line with the views expressed in the artist's reflections, we envision footprints supporting further 'presencing' activities – experiences designed to bring a sense of being present in a particular place. For example with the artist at the point where the work was created.

Accommodating memories and associations: Art mapping can prompt and record memories and associations around places as a particularly personalised type of engagement. With this in mind a footprint could support personal narratives intersected with artworks, and further presencing activities that share personal experiences of artworks in place. Collected data could also be used as a basis for participatory interrogation of what the artist has achieved in terms of provoking associations with place for the audience.

Identifying placeful relevance: Aside from relevance to particular locales, artworks can hold place-related meanings that are archetypal – e.g. a zoo or domestic scene. This suggests potential to relate works with all instances of a form of place. Stronger ties may be found with some instances, e.g. based on the colour used, the shape of an object, or the activity or mood depicted. Thus interfaces could broaden relevance by making visible artworks that are resonant with particular surroundings. This would constitute a novel application of Harrison & Tatar's suggestion to design *"specific places for specific people engaged in specific events in specific locations"* [14].

Concealing the spatial: Our findings suggest that in some cases an overtly spatial view can overwhelm appreciation of artworks and places, focusing attention on abstract spatial distribution or accuracy of location. In certain contexts, there may be value in covering up the spatial underpinning of art mapping, to allow placefulness to come to the fore.

CONCLUSIONS

Art is an essential form of human expression and creativity that is commonly considered antithetical to the mechanistic and rational. Art mapping takes these expressive forms, and asks us to represent them via geotagging. In this, art mapping is an unconventional activity that both utilises and

challenges spatial systems. By analysing the different approaches taken in the user study, and the visions and critique of current systems by the artists, we have highlighted the potential for conceiving engagement with a broader 'footprint' of an artwork. Through this, systems could make visible human ways of understanding artworks, while maintaining the benefits of a spatial approach.

A further iteration of ArtMaps is available online at: http://artmaps.tate.org.uk, with source code available to reuse or adapt with other collections. In this iteration, we have begun to address some of the design issues raised here, such as classifying forms of suggestion. Future work will look to further challenge the singular 'dot on the map' representing most object-locations relationships.

By studying art mapping we extend geotagging, and hit limitations in functionality that suggest directions towards extending spatial representation. As well as identifying characteristics for novel systems to engage with the richly interpretable objects found in art galleries and museums, we would suggest that systems in areas such as online mapping and social media could expand the ways in which they utilise geotagging towards greater openness to multiple, user-constructed meanings. This data may need structure and categorization, but the approach has value in opening up to user-led construction of multiple interpretations of object-location relationships. In developing UbiComp and an Internet of Things, the implications of art mapping could be applied to other objects where singular forms of location tagging may actually be fundamentally insufficient.

ACKNOWLEDGEMENTS

This work was funded by RCUK through the Horizon Digital Economy Research grant (EP/G065802/1) and an RCUK Telling Tales of Engagement grant (EP/K037560/1).

REFERENCES

1. Arase, Y., Xie, X., Duan, M., Hara, T., & Nishio, S. (2009). A game based approach to assign geographical relevance to web images. Proc. WWW'09. ACM. 811-820
2. Benford, S., Anastasi, R., Flintham, M., Drozd, A., Crabtree, A., Greenhalgh, C., Tandavanitj, N., Adams, M., & Row-Farr, J. (2003). Coping with uncertainty in a location-based game. IEEE pervasive computing, 2(3), 34-41
3. Bodenhamer, D. J., Corrigan, J., and Harris, T. M., eds. (2010) Spatial Humanities : GIS and the Future of Humanities Scholarship. Indiana University Press.
4. Brown, B., & Perry, M. (2002). Of maps and guidebooks: designing geographical technologies. Proc. DIS'02. ACM. 246-254
5. Chalmers, M., & Galani, A. (2004). Seamful interweaving: heterogeneity in the theory and design of interactive systems. Proc. DIS'04. ACM. 243-252
6. De Certeau, M. (1984) The Practice of Everyday Life, tr. by S. Rendall, Berkeley California: University of California Press. 117
7. Dourish, P. (2006). Re-space-ing place: place and space ten years on. In Proc. CSCW'06. ACM. 299-308
8. Erickson, I. (2010). Documentary with ephemeral media: Curation practices in online social spaces. Bulletin. Science Technology & Society, 30(6), 387-397
9. Gaver, W., Beaver, J. & Benford, S. (2003). Ambiguity as a resource for design. Proc. CHI'03. ACM, 233-240
10. Geonames, http://www.geonames.org/
11. Google Places, https://developers.google.com/places/
12. http://www.theguardian.com/profile/halley-docherty
13. Harrison, S., & Dourish, P. (1996). Re-place-ing space: the roles of place and space in collaborative systems. Proc. CSCW'96. ACM. 67-76
14. Harrison, S., & Tatar, D. (2008). Places: people, events, loci–the relation of semantic frames in the construction of place. J. of CSCW, 17(2-3), 97-133
15. History Pin: https://www.historypin.org/projects/
16. Ingold, T. (2009). Against space: Place, movement, knowledge. In. Boundless worlds: An anthropological approach to movement, 29-43
17. Lopatovska, I., Bierlein, I., Lember, H., & Meyer, E. (2013). Exploring requirements for online art collections. Proceedings of the American Society for Information Science and Technology, 50(1), 1-4
18. Neustaedter, C., Tang, A., & Tejinder, J. K. (2010). The role of community and groupware in geocache creation and maintenance. Proc. CHI'10, ACM. 1757-1766
19. O'Hara, K. (2008). Understanding geocaching practices and motivations. Proc. CHI'08. ACM. 1177-1186
20. Phillips, L. B. (2013). The temple and the bazaar: Wikipedia as a platform for open authority in museums. Curator: The Museum Journal, 56(2), 219-235
21. Quercia, D., O'Hare, N. K., & Cramer, H. (2014). Aesthetic capital: what makes London look beautiful, quiet, and happy?. Proc. CSCW'14. ACM. 945-955
22. Schaefer, M., Tatar, D., Harrison, S., (2010) Can CSCW Technologies Help Us Re-construct Places?, Proc. CSCW'10. ACM. 567-576
23. Sengers, P., & Gaver, B. (2006). Staying open to interpretation: engaging multiple meanings in design and evaluation. Proc. DIS'06. ACM. 99-108
24. Trant, J., & the participants in the steve.museum project. (2006). Exploring the potential for social tagging and folksonomy in art museums: Proof of concept. New Review of Hypermedia and Multimedia, 12(1), 83-105